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5 JUN. 1915
ENTOM.

Maine Agricultural Experiment Station

ORONO

BULLETIN 233

NOVEMBER, 1914

MAINE APHIDS OF THE ROSE FAMILY

Entom. Paper 44.

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BULLETIN 233.

MAINE APHIDS OF THE ROSE FAMILY.*

EDITH M. PATCH.

It is the purpose of this paper to give descriptive accounts with drawings of those aphids found in Maine upon the members of the rose family. The most serious of the apple aphids have been treated elsewhere and will receive little more than mention here. Our plum aphids, however, have not been worked up before and as some of these are troublesome each year it seems desirable to have them recorded. Also plants, whether weeds or ornamental varieties, which are allied to vegetation of economic importance are suitably included in the same treatment, as certain aphids do not confine themselves to one species of plant but take several closely related species.

AMELANCHIER. Juneberry.

PROCIPHILUS CORRUGATANS Sirrine. Woolly Aphid of Hawthorn Leaf.

(Figure 93, D-E. Figure 95, L.)

A species which I have been considering the insect described by Mr. Sirrine is common in the vicinity of Orono upon both *Crataegus* and *Amelanchier*, inhabiting the ventral surface of the leaf which it distorts into a rolled curl. Professor Gillette (1909) has figured the antenna of this species and recorded it from various parts of the United States. Mr. J. J. Davis (1911) states that both the Colorado and Maine specimens are *alnifoliae* of Williams. Thus unless *alnifoliae* is a synonym of *corrugatans*, the species under consideration should be known

* Papers from the Maine Agricultural Experiment Station: Entomology No. 77.

as *P. alnifoliae* Williams. Tullgren (1909) has described a species as *Prociphilus crataegi* which is closely allied to the species in this country and may perhaps prove to be the same.

The spring migrants take flight from the primary host from the middle of June to early in July. The summer host is not known.

Stem female. The first generation becomes mature early in June in this vicinity. While immature this form is of a soft greenish color and flocculent. A single individual is found in each infested leaf. Usually by June 5 these stem females begin to produce and the young are pale green and flocculent. When old and wrinkled the stem female becomes dark. The beak reaches the second coxa. The antenna is 5-jointed.

Alate female. Spring migrant. Both my notes and what collections I have would indicate that the entire second generation become winged. A freshly molted individual has a light brown head and prothorax, thorax paler than head, wing veins delicate and abdomen pale olive green. Later the lobes are all purplish black; wings hyaline, with dark slender veins, and stigma conspicuously dark; abdomen rather bright green. The antenna is sometimes with and sometimes without annular sensoria on VI. The relative lengths of IV and V are somewhat variable, V sometimes being decidedly longer than IV and sometimes coequal or even slightly shorter.

Newly molted pupae are yellow, later they are colored much as the freshly molted winged form and flocculent. In this stage the insect is decorated with woolly tufts on head and thorax, the abdomen is flocculent along caudal and lateral margins while along the mid-dorsum the wax appears in little tufts arranged in two rows converging at thorax.

By detaining spring migrants in captivity I have secured third generation nymphs. These in the first instar have a 4-jointed antenna. Their long beaks extend by the length of the two terminal joints beyond the cauda. Where these nymphs develop is not known as we have no clue as to the summer host.

Maine collection numbers 14-06; 27-06; 40-06; 3-07; 29-10; 16-11; 37-13. An Ithaca (New York) collection taken May 19, 1911, had only immature stem females.

CRATAEGUS.

PROCIPHILUS CORRUGATANS Sirrine. Woolly Aphid of Hawthorn Leaf.

This species, just recorded for *Amelanchier* is also common on *Crataegus* leaves in the spring. Maine collection numbers 50-04; 50-06; 67-12; 40-13.

SCHIZONEURA LANIGERA. Woolly Aphid of the Apple.

This species is discussed for Maine in Bulletin 217 of the Maine Agricultural Experiment Station. The Maine collections from English Hawthorn are *Crataegus oxyacantha* (112-12, 176-12) and native *Crataegus*. (114-06, 67-11, 184-12).

MACROSIPHUM CRATAEGI Monell.

(Figure 91, I. Figure 95, J.)

This elegant species is not uncommon in the vicinity of Orono on the petioles and ventral surface of leaves and on tender new growth shoots of *Crataegus*.

Alate female. My notes for No. 96-06 record this form as follows: Head yellow with black eyes and conspicuous black ocelli, antenna dark except basal joints, III with numerous sensoria, IV with few or none; prothorax and thorax yellow, legs with yellow femora and dark tibiae and tarsi, wings with rather heavy dark brown veins; abdomen yellow with four vivid green spots in a quadrangle, cornicles cylindrical and dark, cauda light yellow.

The nymphs and apterous viviparous form are also bright yellow with four vivid green spots on abdomen placed as with the winged females. The antenna of the apterous female has III with few sensoria or none.

Maine collection numbers 96-06; 30-11; 31-11; 50-11; 58-11; 144-13.

In a letter dated June 28, 1910, Mr. J. T. Monell sent me some notes on this species which might well be quoted here. He wrote as follows:

"I have never taken any specimens except the apterous ones of the type slide 72° July 4, 1878. The antenna of the largest

was measured September 1908 and gave III, .856; IV, .579, V, .585; VI*, .143; VII*, 1.356 mm. Length of body 2.2 mm. The measurements are approximate, being made with camera lucida. In September, 1908, Professor Gillette sent me 707x from Fort Collins, Col., on cultivated *Crataegus*, some half grown apterous specimens which I identified as *crataegi*. He says in his letter 'apterous are not yellowish green but light yellow tinged with green, each louse has upon its dorsum four conspicuous green spots arranged in form of a quadrangle—two near the bases of the cornicles and two near the metathorax. The antennae are not black on joints 3, 4 and 5, but these joints are annulated with black at the distal ends.' September 28, 1908, Professor Gillette sent me alcoholic winged material which I mounted as 722x. Evidently all are males. One antenna measured III .599, IV .514, V .499, VI* .114, VII* .914 mm."

"September 21, 1908, Mr. Davis wrote he had *crataegi* at Chicago saying 'it agrees with description except in antennal coloration, the antennae being entirely pale except at joints 3+4, 4+5 and 5+6. Also legs are brownish'."

APHIS AVENAE (Fab.) Oat Aphis.

(Figure 90, G-I. Figure 96, D.)

A collection of *avenae* (33-12) made from *Crataegus* at Orono June 14, 1912, is interesting enough to record. Alate viviparous females and pupae were taken. The latter were green with darker green longitudinal median and sub-lateral lines between which ran a row of whitish spots. There were no rusty or orange colored markings near the cornicles. On date of collection 12 of the migrants were caged in the laboratory on young oats. Of the two of these which settled on the grain and produced progeny, one remained alive and active until June 25. The nymphs were very pale green with rusty yellowish places at base of cornicles and connecting them. Two of these had reached maturity and were producing young on June 26. These were both apterous and the rusty orange curve connecting the cornicles was conspicuous in the adult stage. On June 29 one pupa was

* That is basal VI and spur of VI.

noticed and this acquired wings July 1. The first grain generation born of migrants from *Crataegus* is thus seen to comprise both alate and apterous females. Fig. 90, H, is a drawing of the antenna of a spring migrant and Fig. 90, G, that of the next generation reared on oats in confinement, both being done to the same scale.

This species whether found on the winter or summer host is characterized in the winged forms by M branching the second time very near the margin of the wing. In fact M not infrequently runs way to the edge of the wing before branching more than once thus giving a venation such as we find in the genus *Toxoptera*, a 2-branched M.

Maine Collections from *Crataegus*, 33-12, 39-13, 103-14.

APHIS BREVIS Sanderson. The Long-beaked Clover Aphid.
(Figure 94, D. Figure 95, K. Figure 97, B.)

This species which was described by Professor Sanderson from the quince, is very abundant upon hawthorn in Maine. It migrates for the summer to clover and sweet peas and possibly other legumes.

It resembles *bakeri* in having very short cauda and cornicles, but is at once separated from that species by its longer beak which reaches well beyond the second coxa and sometimes to the third. The antenna and the stigma of the wing, further separate this species from *bakeri* as do also the blunter lateral tubercles of the prothorax and abdomen.

On the hawthorn it lives in the leaves causing them in the spring to become distorted into dark purple curls.

APHIS BAKERI Cowen. The Short-beaked Clover Aphid.
(Figure 94, E. Figure 95, I.)

I have made a single fall migrant collection of this species from hawthorn. (104-14). Oct. 1, 1914. The figures show the characters of the antenna and wing. This species is discussed as an apple pest by Gillette and Taylor (1908). Like *brevis*, which it resembles in the shortness of its cauda and cornicles, it migrates to clover for the summer.

FRAGARIA. Strawberry.

MYZUS POROSUS Sanderson.

(Figure 91, J-M. Figure 96, H.)

On September 24, 1912, some wild strawberry vines growing in the Station greenhouse near an open window were found to be heavily infested with pale yellow and pale green apterous oviparous aphids with pale cornicles. Winged males were also present. The plants were colonized on both upper and lower surface of leaves, on the leaf stem and along the runners. Antenna of male has III with 15 or 20 sensoria, IV with 1 to 10, and V with 8 more or less, as shown in the figures. The cornicle is graceful and slender. Maine collection No. 171-12.

PRUNUS. Cherry.

MYZUS CERASI (Fab.).

(Figure 92, H-K. Figure 95, B.)

A species so distinctive that there is no danger of confusing it with other aphids is rather a relief. *Myzus cerasi* is a glossy black plant louse of world wide distribution and a common pest upon both wild and cultivated cherries, congregating on growing shoots and ventral surface of leaves which become badly deformed. I have taken it in Maine on *Prunus pennsylvanica*, L. and *P. serotina* Ehrh, but have not followed the fortunes of this insect through its seasonal history.

Apterous females of collection 57-06 taken July 3 are recorded as follows:—head and eyes black, antenna black with III and IV pale and with no sensoria except those usual for V and VI; prothorax and thorax, black, leg with femora pale proximally and black distally, tibia pale except distal tip, tarsus black; abdomen, long tapering cornicles, and cauda black.

Alate females of the same collection had head and eyes black, antenna black with about 12 sensoria on III (collections of subsequent years had as many as 18) in a somewhat irregular row, usually none on IV, and with two of the marginal sensoria on VI approximately as large as the terminal sensorium thus giving three large sensoria and several small ones in the group at base of spur; prothorax and thorax black, prothoracic tubercle very small, wing with slender brown veins,

leg with femora pale proximally and dark distally, tibia pale except distal point, tarsus black; cornicles long tapering and black, cauda black, abdomen glabrous black.

A collection made Sept. 14 (80-11) comprised sporadic alate females, apparently recently alighted, with young nymphs on leaves of wild cherry. As will be seen by Fig. 92, H, the antenna differs from that of the earlier females in having fewer sensoria on III.

The Maine collection numbers are, 38-14, June 14, apterous females, nymphs and pupae; 1-05, May 31, apterous females and pupae nearly ready for the molt to alate females; 14-05, July 3, alate and apterous females; 21-06, June 12, apterous females and colonies; 38-06, June 21; 57-06, July 3; 127-06, July 6; 9-08, June 16; 107-10 apterous females and pupae, August 30; 80-11, Sept. 14, winged females sporadic on leaves with young nymphs; 42-13, June 8, apterous females and nymphs; 59-13, June 23, apterous and winged females.

APHIS FURCATA. n. sp.

(Figure 94, F. Figure 95, C.)

A tiny aphid on choke cherry (*Prunus virginiana*) resembles *avenae* in having the second branch of M very near the margin of the wing, but is distinguished by having antennal III with 7 to 12 sensoria in a row, IV and V about equal in length, IV with usually one sensorium (sometimes more, sometimes none) about midway, and total antennal length nearly equal to the body length. The cornicle is straight to tip, without the distal constriction and flange which is conspicuous in *avenae*. The antennal characters of *furcata* are much like *gossypii*; but it can be distinguished by the wing and cornicle, M branching nearer the margin in *furcata* and the cornicle being shorter. In life the color scheme is different.

The head and antenna are dark, the eyes black, the beak extends to second coxa; prothorax dark, membrane lighter, lateral tubercles prominent; thorax greenish with dorsal lobes and ventral shield black; wings with slender dark brown veins; abdomen green, unmarked except 3 lateral dots in a row; cornicles dark brown; cauda light.

I have taken this species but once (99-06) at Orono, August 6, 1906, from the ventral surface of leaf, causing curl.

MYZUS PERSICAE Sulzer.

(Figure 90, F. Figure 96, G.)

Fall migrants of this general feeder were taken abundantly on choke cherry, Sept. 27, 1910 at Monmouth (142-10) and Sept. 24, 1912 at Orono (166-12.)

APHIS CERASIFOLIAE Fitch. Choke Cherry Aphid.

(Figure 89, G-J. Figure 95, G. Figure 97, C.)

This well defined species is common upon both the native choke cherry, *Prunus virginiana* and the western *P. demissa* Walp. introduced in a nursery row on our campus.

Apterous female. Head, pale green or water whitish, beak short, extending to 2nd coxa, eyes, antenna with I, II and III concolorous with head, distal half darker to black, III with no sensoria, proportions as shown in the figure; prothorax pale green, lateral tubercles present; thorax green with dark green mid dorsal line, femora and tibiae pale and tarsi black; abdomen pulverulent, pale green with dark green medial line and dark green transverse lines between segments, lateral tubercles present, cornicles pale with dusky tip slender, slightly tapering and approximately twice the tarsus in length, cauda white with dark tip, conical, being broad at base and abruptly tapering.

The nymphs and pupae are also pulverulent and have the dark green mid dorsal and transverse intersegmental lines, though these are not always well defined in the pupa which has two lateral dark green stripes on thorax.

Alate female. Head black, beak short, not reaching second coxa, eyes black, antenna dark, III with from about 12 to 18 large sensoria about the size of the terminal one on V, IV with from none to several sensoria like those of III, proportion of joints as shown in the figure; prothorax green with black transverse band, lateral tubercle present; thorax black, wings iridescent with slender brown veins and large dusky stigma with pointed tip; M commonly though not always with second branch very short, abdomen glabrous, rather bright though

not vivid green, median line dark green, sutural lines dark green ending in marginal green dots, cornicles dark, cauda green.

Aphis cerasifoliae is gregarious on the ventral surface of the terminal leaves badly curling and deforming them. A copious amount of honey dew is present, and ants are usually found attending a colony of this species.

Maine collections—3-04; 21-04; 19-06; 11-08; 87-09.

APIHS TUBERCULATA *n. sp.* Red and Black Aphis of Cherry.

(Figure 89, D-F. Figure 95, A. Figure 97, A.)

A striking species was collected August 5, 1913 at Orono in dense red masses on new growth shoots of Black cherry. (*Prunus serotina*). It did not occur on the leaves. The head, cauda, cornicles, legs, prothorax and mesothorax are black with white "bloom" and the rest of the body showy red. My 1914 collection notes give for this species,—the body of *Aphis tuberculata* is a light mahogany red touched with a soft very slight "bloom" of white pulverulence. Genital and anal plates black, lateral margin of abdomen marked with a row of a few indistinct dark dots. Cauda ringed with white pulverulence near base.

Alate female. Antenna with III having 20 or more large sensoria irregularly arranged, IV with about 6 sensoria; V with 4 to 6 sensoria besides the terminal one, relative length of segments shown in the figure; beak extending about second coxa; cornicle about two and one half times the length of tarsus, straight, cylindrical and heavily imbricated; cauda about half the length of cornicles and shaggy; wings with veins all uniformly dark and heavy and all shadowed along their course.

The prothoracic tubercles are broad and blunt and unusually large for the genus. The lateral tubercles of the abdomen are similar in contour but are not so large.

Apterous female. The antenna of this form is shown in D. Figure 89. It is without sensoria except for those usual for V and VI.

PRUNUS. Plum.

APHIS CERASIFOLIAE Fitch.

(Figure 89, G-J. Figure 95, G. Figure 97, C.)

On two occasions I have collected this species on *Prunus nigra* Ait., where it colonies the ventral surface of terminal leaves, curling them as it does those of the choke cherry. 42-10.

APHIS PRUNORUM Dobrowljansky? Black and Brown Aphid of Plum.

(Figure 89, C. Figure 95, D.)

This species is common in Maine in June on the ventral leaves and twigs of the cultivated plum, ordinarily not causing a curl. Specimens of the alate viviparous female from cultivated plum collected at Canton, New York, June 11, 1909, have been sent me.

Alate viviparous female. The head, prothorax, thorax, and cornicles are black; the abdomen is dark brown; the cauda is dark; the wings are somewhat smoky with dark veins. The beak extends to or beyond the second coxa. The lateral tubercles of the prothorax and abdomen are prominent and about ten times as long as broad. Antennal III with about 20 or fewer irregularly placed sensoria scattered the whole length of joint; IV frequently with no sensoria, but also frequently with one or two on the distal half; V with no sensoria except the terminal one; spur of VI not much longer than III; IV and V about equal in length. The fore wings are characterized by a long stigma with pointed tip with Rs joining it somewhere near the middle of the margin, the second branch of M usually, though not always, near the margin of the wing; the hind wing is large, full curved and with the veins nearly as heavy as those of the fore wings. The cornicle is slender, about twice the length of the cauda, constricted slightly near the middle and again just before the tip. The pupal nymph which develops into this form is dull greenish brown with greenish pads. Head and entire body pulverulent both dorsally and ventrally, the powdery dots on the abdomen being arranged in lateral lines and also transversely at the two extremes of the abdomen.

The apterous viviparous parent of the foregoing form is a nearly uniform dark brown with tibiae lighter than rest of the body.

This species has apparently not been recorded previously from America. I had it described as new in manuscript but it so closely resembles *Aphis prunorum* Dobrowljansky that I hesitated to publish it under another name. It does not seem to fall conveniently into either *Aphis*, *Mysus*, *Rhopalosiphum* or *Siphocoryne* as ordinarily interpreted. It is, however, closely allied to *Siphocoryne* (?) (*Rhopalosiphum*) *nymphac*, and on the basis of alcoholic material alone I should not be certain that it may not fall as a synonym of that species. This is offered merely as a suggestion for future migration tests.

Maine collection numbers 41-06; 11-09; 20-09 in part; 21-09; 31-09; 36-12; 47-12; 62-12; 169-12 in part.

APHIS CARDUI Linn? (*pruni* Koch) (*prunifoliae* Fitch).

The Long-beaked Plum-Thistle Aphis.

(Figure 92, L-M. Figure 95, F.)

The full cycle for this species has not yet been recorded for America. I have no experimental evidence as yet that the plum-thistle cycle is established for this country. I had, however, noticed that structurally *prunifoliae* Fitch and *cardui* were close and migration tests were planned to ascertain whether they proved to be the same species, when Dobrowljansky (1913) published the fact of the plum-thistle migration for Europe and the synonymy of *cardui* and *pruni* Koch. There seems so little doubt that the species here treated is the same as the European that I am so listing it with the mere precaution of a question mark biding the time of experimental evidence.

There is a very good color description of this species in the third report of Thomas (1879) which accords exactly with Maine material. Both the apterous and alate forms are hard, shiny, and glistening in their black and green.

Among the apterous forms are two color varieties, one conspicuously decorated with a big, shiny black patch on the abdomen which sometimes covers nearly the whole dorsum. Other apterous individuals lack this as recorded by Thomas. These

may, perhaps, belong to distinct generations, though they are both present at the same time.

The alate viviparous form has a shiny black head and thorax and a pale green abdomen decorated with lateral black dots, a large dusky spot on the dorsum, black cauda, cornicles, and ventral patch and dashes of black on ventral abdominal segments 4, 5 and 6. The beak extends to or in some cases well beyond the third coxa. The wings are not particularly distinctive but are characterized by a short stigma in the fore wing and the curve in the hind wing sufficient to render the proximal part rather slender. The antenna has 30 more or less sensoria irregular in size and irregularly placed along III, and IV without sensoria; V is shorter than IV and the spur of VI about the length of III. The cornicle is cylindrical and its length in relation to antennal III is shown in the figure.

This species inhabits the new growth twig and ventral surface of terminal leaves causing curl.

Maine collection numbers 16-04; 17-04; 17-06; 18-06; 123-06; 7-09; 25-10; 50-12; 73-12; 169-12 in part.

Aphis avenae and *Aphis brevis*. Fall migrants of these species I have taken together on cultivated plum (169-12), but these have received fuller treatment elsewhere.

PHORODON HUMULI. The Aphid of Plum and Hop.

(Figure 89, A-B. Figure 95, H.)

This is a serious pest on both its food plants in certain parts of the country. As the hop is only incidental in Maine we do not often get complaints of this plant louse on its summer host. It is sometimes injuriously abundant on plum, causing leaf curl. This is not a mealy species.

The apterous forms are very pale green with a median and lateral lines of darker green,—giving three rather conspicuous longitudinal dorsal stripes. The dorsum of the winged form is decorated with black markings and there are lateral black spots. The antennae are shown in Fig. 89. The projection of the head at base of the antenna is the conspicuous distinctive feature of this aphid both in the winged and wingless forms. Maine collection numbers 70-12 on plum, 77-12 on hop.

HYALOPTERUS ARUNDINIS (*Pruni*) Fab. Mealy Aphid of Plum and Arundo.

(Figure 89, K. Figure 95, E.)

A heavy infestation of this species occurred on a variety of large green plum at Orono in 1910 and again in 1912. Late in July the leaves on the ventral surface were so thickly packed that many of the aphids could find resting place only for their beaks, their bodies being pressed out from the leaf and supported by one another. There was no tendency to curl, the foliage remaining even flatter than a normal leaf. The notes taken at the time of this collection (79-10) July 27 are as follows:

Alate viviparous female. Migrant. Head dark green, pulverulent; antenna dark, III with 30 more or less sensoria, IV with row of about 8 sensoria; eyes reddish black; beak pale proximally, dark distally, short and thick not reaching second coxa; prothorax green, pulverulent; thorax green with lobes dusky, venter dusky black, dorsum and venter pulverulent; veins slender, hind wing rather small and weak; femora and tibiae green, tarsi black; abdomen slender, tapering, light green with dark green median streak including cauda and with 1 longitudinal dark green streak on each side, pulverulent; cornicles black, shorter than cauda, constricted at base.

The pupal nymph in last instar previous to winging is colored about as the apterous viviparous, wing pads slightly dusky at margins.

Apterous viviparous female. Head pale green; antenna pellucid with tip dusky, pulverulent; prothorax and thorax light green, pulverulent; femora and tibiae pellucid and pulverulent, tarsi dusky; abdomen slender, tapering, pulverulent, light green with 3 dark green longitudinal markings the mid dorsal one extending so as to include cauda; cornicles dark. Packed unbelievably close on ventral leaf which remains uncurled. Maine collection numbers 79-10; 75-12; 108-12. As the name indicates this species migrates to certain grasses for the summer generations.

PYRUS AMERICANA, P. SITCHENSIS, etc. Mountain Ash.

SCHIZONEURA LANIGERA. Woolly Aphid of Apple.

This species is as common on *Pyrus americana*, *P. sitchensis* and other mountain ashes about Orono as it is on the apple. It migrates in Maine to the mountain ash in June as it does to the apple and the return migration takes place in the fall. For a fuller discussion of this species see *Pyrus malus*.

Aphis pomi, The Green Apple Aphis, is common on our native mountain ash. This is discussed under apple.

PYRUS MALUS. Apple.

The most serious aphids which have been recorded for the apple in Maine are discussed in other publications of the Maine Agricultural Experiment Station so that they need only be touched lightly here.

SCHIZONEURA LANIGERA (*americana* in part of authors). The Woolly Aphid of the Apple.

This species causes terminal leaf cluster or rosette on the elm in the spring and migrates to the apple for the summer generations, fall migrants returning to the elm (*Ulmus americana*) in the fall where the true sexes are developed and the winter egg deposited. The life cycle of this species is further complicated by hibernating nymphs which remain about the apple tree through the winter, and by root forms which are found throughout the year on apple roots. How long, under favorable climatic conditions, the apple can serve as a host for this pest independent of reinfestation from the elm has not been ascertained. In Maine an annual spring and fall migration occurs.

This species can be distinguished from others of the same genus inhabiting the leaves of elm by the antenna and the character of the wax glands.

APHIS AVENAE *Fab.* The *Aphis* of Oat and Apple.

(Figure 90, G-I. Figure 96, D.)

This species migrates from the apple and certain other members of the rose family to the oat or other grasses for the

summer, so that it is ordinarily found on the apple only in the spring and fall and in the egg stage, during the winter. It is characterized by the short distal branch of wing vein M, the peculiar distal constriction and flange of the cornicle, and the antenna, details which are shown in the figures.

APHIS POMI. The Green Apple Aphis.

This species is by far the most troublesome of the leaf aphids of the apple in Maine. It is not migratory and is, therefore, to be found at all seasons of the year upon the apple in some form or other. Like *avenae* and *sorbi* this aphis passes the winter in the egg stage on the apple tree. At other times it is to be found on the new growth shoots and leaves or even on the fruit itself.

APHIS SORBI. Rosy Aphis of the Apple.

(Figure 90, E. Figure 96, B.)

There is no difficulty in recognizing this species as the dorsal tubercles of the head, prothorax and caudal segments of the abdomen, as well as the antennal characters serve to distinguish it. Professor Sanderson (1901-02) gives a very careful account of this species with good color notes for the different forms. Maine collection numbers 32-09; 39-09.

MYZUS PERSICAE Sulzer.

(Figure 90, F. Figure 96, G.)

The only collection of this general feeder that I have made from apple was in 1911 where winged forms that had developed on chrysanthemums in the greenhouse colonized with their progeny on apple seedlings growing in the same house. Maine collection number 91-11.

PYRUS JAPONICA.

APHIS BREVIS Sanderson. The Long-beaked Clover Aphid.

(Figure 94, D. Figure 95, K. Figure 97, B.)

Specimens of this species were taken on Japanese quince, June 28, 1906, and again July 21, 1906. Maine collection numbers 56-06, 80-06. A discussion of this species is given under *Crataegus*.

ROSA.

MACROSIPHUM ROSAE Linn.

(Figure 93, A-C.)

This world-wide species I took on the Maine Campus in 1905 and again in 1914.

The apterous form is striking on account of the contrasting black and green in the coloring. General body color pale green with very pale cauda; the antenna is dark and the long cornicles black; the legs with distal femora, distal tibiae, and tarsi black, the rest green. Antennal III with proximal portion somewhat bulkier than the rest and bearing sensoria as shown in the figure. The distal reticulations of the cornicle are heavily marked and the area they cover is somewhat more slender than the rest of the cornicle.

The alate viviparous female has antennal III crowded with sensoria, none on IV and only the ordinary terminal ones for V and VI. The beak reaches second coxa. There is nothing remarkable about the wings which are an ordinary Macrosiphum type. Maine collection numbers 59-05, 75-14.

MACROSIPHUM SOLANIFOLII Ashmead?

(Figure 90, A-D. Figure 96, A.)

This species has not yet received experimental tests as to its summer host. However, the strongly marked, clear cut, though slender, venation; the antennal characters; the beak length; the pink and green color varieties; the cauda and the cornicles; all are identical for this widespread species on the rose and *Macrosiphum solanifolii* Ashmead as found on the potato in summer. It seems so unlikely that two species could show such a complete resemblance that I am listing this species as *solanifolii* with a question mark, until the matter be given a conclusive experimental test. It is our most common species on Japanese rose bushes on the campus.

MACROSIPHUM DIRHODUM (Walker.)

(Figure 92, A-C. Figure 96, E.)

An aphid on Japanese rose on the campus at Orono with the preceding species appears to be *dirhodum* as given by

Theobald (1913). The Maine material is named also with reference to Colorado specimens received from Mr. Maxson who has worked out the host cycle as a migration between rose and grain. It is readily distinguished from the foregoing rose species by its non-reticulated cornicles and the greater number of sensoria on antennal III of the alate viviparous female. There is nothing particularly distinctive about the wing characters.

MYZUS ROSARUM.

(Figure 92, D-C. Figure 96, C.)

For the identification of this species I am indebted to Professor Gillette for named material from Colorado for comparison. The accompanying figures of antennae, cornicles and wings will probably serve to characterize this aphid. Maine collection 14-14 was taken on the Maine Campus by Mr. Geo. Newman June 11, 1914.

RUBUS.

APHIS RUBIPHILA n. sp.

(Figure 91, G-H. Figure 96, F.)

An aphid about the size of *gossypii* and resembling it in wing venation and length of cornicle, I have taken in Maine on wild red raspberry. A good colony was found June 26, 1906, (44-06), inhabiting the stem and ventral leaves.

The alate female had head shiny black, antenna dusky, eyes black, prothorax with pale membrane and prominent lateral tubercles; thorax shiny, wings with slender dark brown veins; abdomen glabrous pale green, lateral tubercles prominent, cornicles nearly concolorous, perhaps a little darker, cauda green and hairy. The sensoria of antennal III are few (4-5) and confined chiefly to the distal two-thirds.

The apterous female is pale green with slightly pulverulent abdomen. Cauda and cornicles lighter than abdomen with the tips of the latter black.

MACROSIPHUM RUBICOLA Oestlund.

(Figure 94, A-C.)

An alate female with 8 nymphs was collected from the ventral leaf of wild red raspberry, August 1, 1906. This had head bluish black dorsally and ventrally pale green, antenna blackish except proximal III, eyes black; prothorax bluish black dorsally, and ventrally green; marked transversely with pale green at membrane and space cephalad thorax; tubercles distinct; thorax with lobes glistening bluish black, lateral portion pale green with two black patches, ventrally green, wings clowned at apex inclosing distal portion of Rs, stigma very dark; abdomen glabrous medium green, cornicles brownish black, cauda pale green.

The individual described is evidently darker than those Doctor Oestlund saw. Some specimens taken at the same time here ran lighter. These aphids were taken on ventral leaves and on stems. Maine collections; 92-06, 34-08, 158-12.

SPIRAEA,

APHIS SPIRAECOLA n.n.

(Figure 91, B-C. Figure 96, J.)

This species is certainly close to *pomi* and may possibly be a variety but it does not seem safe to place it with that species at present. It is recorded by Professor Gillette as *Aphis spiraeella* Schouteden (1910). The antenna is practically the same as with *pomi*. The cornicles in the winged form are shorter than any *pomi* I have taken.

APHIS SPIRAEPHILA n. sp.

(Figure 91, D-F. Figure 96, I.)

The most common and constant species for native *Spiraea salicifolia* is the one I am recording as a new species after collecting it for ten years. It apparently spends its whole cycle on the same food plant, as the colonies have been taken from May to August. A collection made May 31, 1913, contained the stem mother still active and her mature apterous and alate progeny, the latter settling like the former on the *Spiraea*

for their broods. The new growth twig was crowded with a thick black encircling mass.

The apterous viviparous form is a plump, totally huckleberry black with a slight white bloom of wax powder. The nymphs are reddish brown to black. The pupal nymphs (Collection 25-13) were black with wax area of "bloom" on abdomen except central median longitudinal path which was without wax, wing pads and thorax dirty green.

The winged female has head and thorax slate black, abdomen with dorsum reddish black and margin slate black, cauda black and cornicles short and black.

The accompanying figures characterize the wing and antennae, the conspicuous thing about the latter being the shortness of the spur of VI.

MACROSIPHUM SPIRAECOLA n. sp. (97-10.)

(Figure 91, A. Figure 96, K.)

A species which I do not feel justified in ascribing to anything already named, I took on *Spiraea Van Houttei*, on the Maine Campus, August 20, 1910. The apterous females with their nymphs were present, but I have not taken the winged form. The color varieties were vermillion, bright green, yellow green, rose pink, and lemon yellow. The young nymphs had the same range in color.

One of the vermillion specimens chosen for the color description is recorded as follows: head vermillion, antenna with I and II pale, III dark, eyes black, beak with first joint pale and third dusky; prothorax and thorax vermillion; femora and tibiae pale brown, tarsi black; abdomen with the slightest bloom, vermillion with mid-dorsum and lateral margin deeper than the rest; cornicles long, clavate, light brown with tip black; cauda vermillion. The accompanying figures give the antennal structures and the cornicle.

NOTE. The drawings of antennae and cornicles accompanying this paper are all done to the same scale and given the same reduction.

LITERATURE CITED.

Davis, J. J.

1911. Williams' "The Aphididae of Nebraska"; A Critical Review. *In* University Studies, Lincoln, Neb. v. 11, no. 3.

Dobrowljansky, W. W.

1913. Zur Biologie der Blattläuse der Obstbäume und Beeresträucher. Entomologische Station des Landwirtschaftlichen Syndikats in Kiew.

Gillette, C. P.

1909. Plant Louse Notes, Family Aphididae. *In* Jour. Ec. Ent. v. 2, p. 351-358.
 1910. Plant Louse Notes, Family Aphididae. *In* Jour. Ec. Ent. v. 3, p. 403-407.

Gillette, C. P., and Taylor, E. P.

1908. A Few Orchard Plant Lice. *In* Bul. 133 Agr. Exp. Sta. Colo. Agr. Col.

Sanderson, E. Dwight

1901 (02). Report of the Entomologist. *In* 13th Ann. Rep't of Del. Col. Agr. Exp. Sta.

Theobald, Fred V.

1913. The British Species of the Genus *Macrosiphum*, Passerini. *In* Journ. Econ. Biol. v. 8, no. 3.

Thomas, Cyrus

1879. Eighth Report of the State Entomologist of the Noxious and Beneficial Insects of the State of Illinois.

Tullgren, Albert

1909. Aphidologische Studien. *In* Arkiv för Zoologi. Band 5, N:o 14.

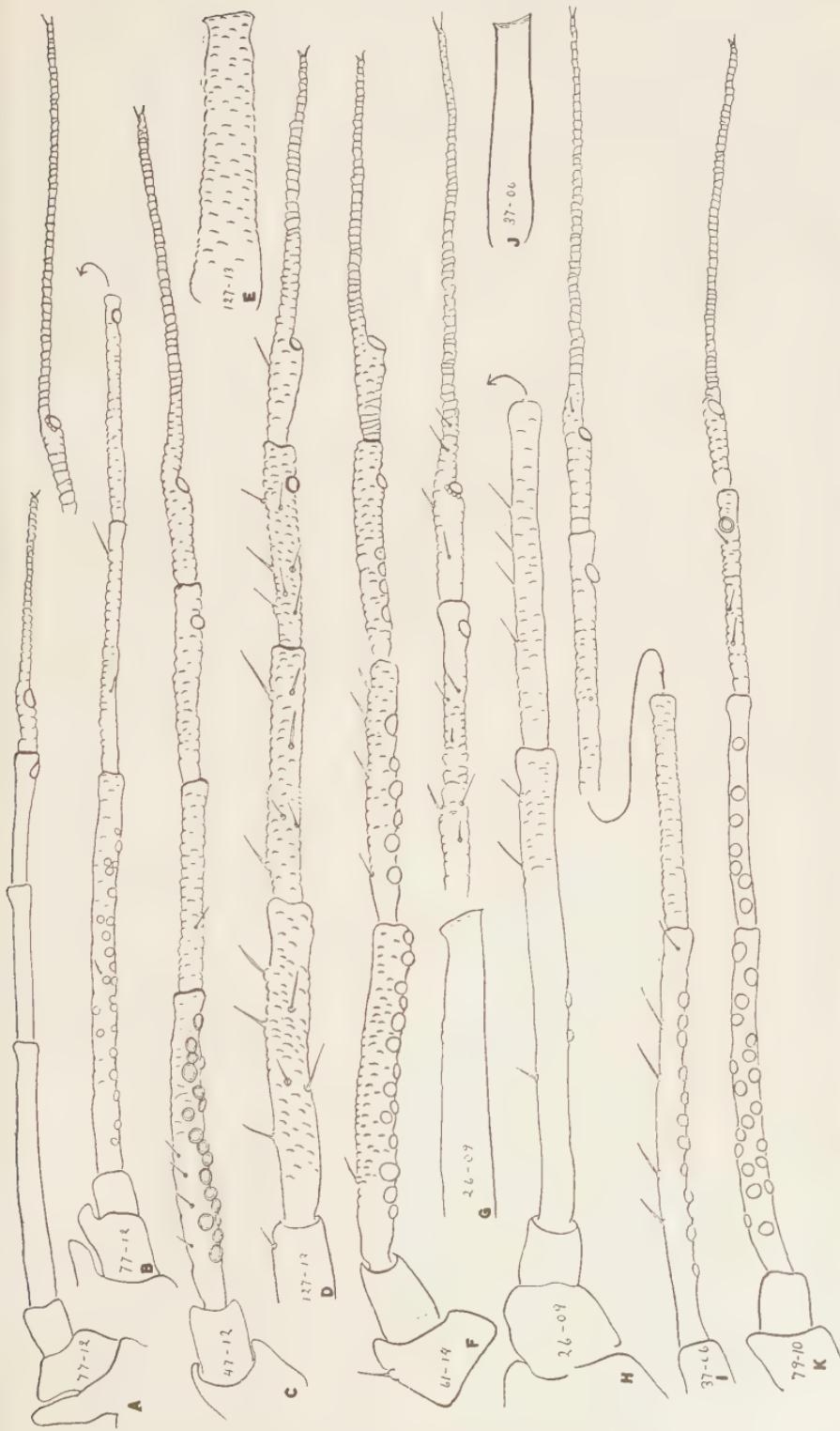


Figure 89. A-B, *Phorodon humuli*, apterous and alate viviparous; C, *Aphis prunorum*, alate viviparous; D-F, *Aphis tuberculata*; D-E, apterous viviparous; F, alate viviparous; G-J, *Aphis cerasifoliae*; G-H, apterous viviparous; I-J, alate viviparous; K, *Hyalopterus arundinis*, apterous viviparous.

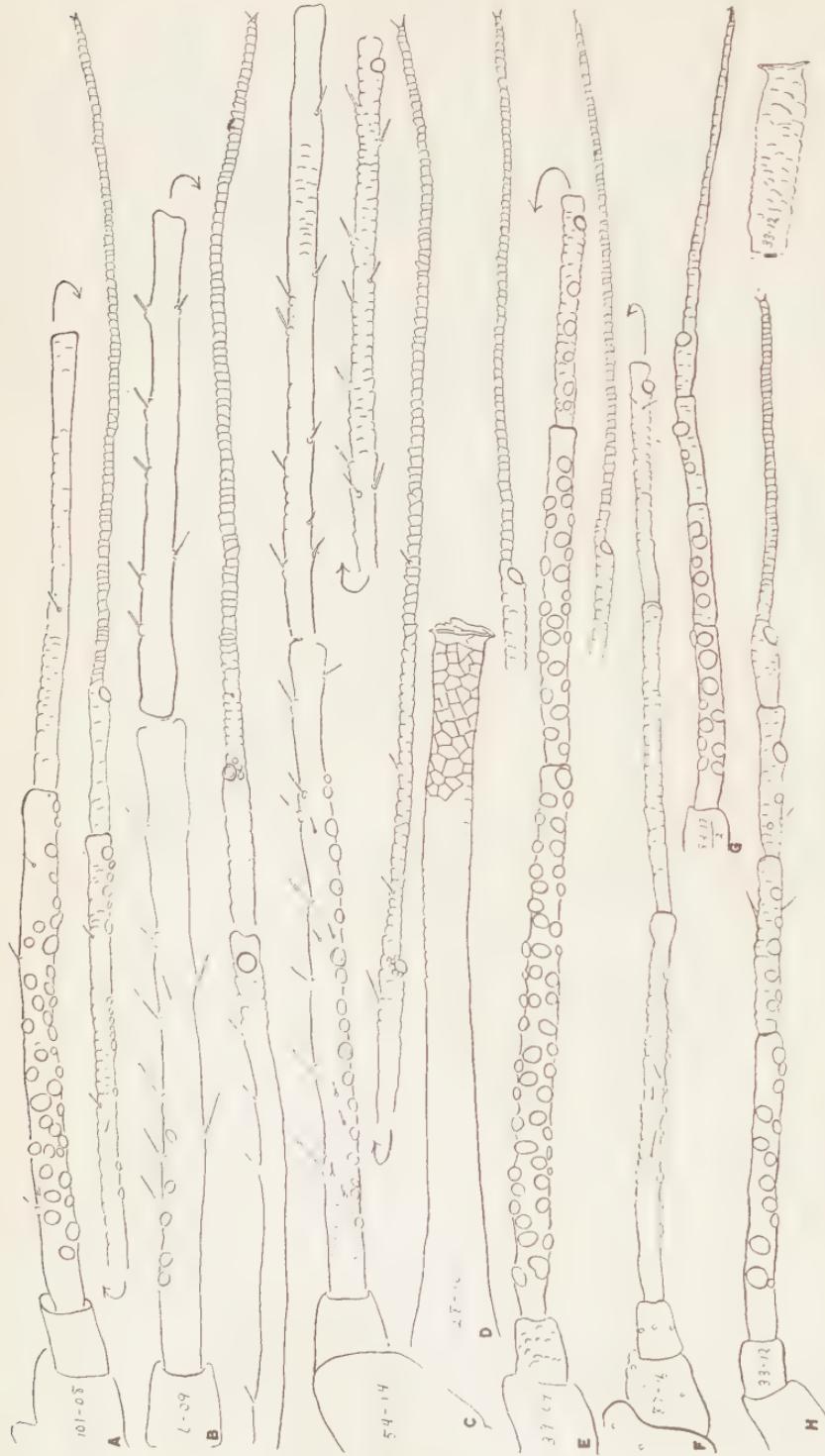


Figure 90. A-D, *Macrosiphum solanifolii?* A, alate male; B, apterous viviparous; C-D, alate viviparous; E, *Aphis sorbi*, alate viviparous; F, *Myzus persicae*; G-I, *Aphis acerina*; G, alate viviparous, oat generation progeny of migrant from hawthorn; H-I, alate viviparous migrant from hawthorn.

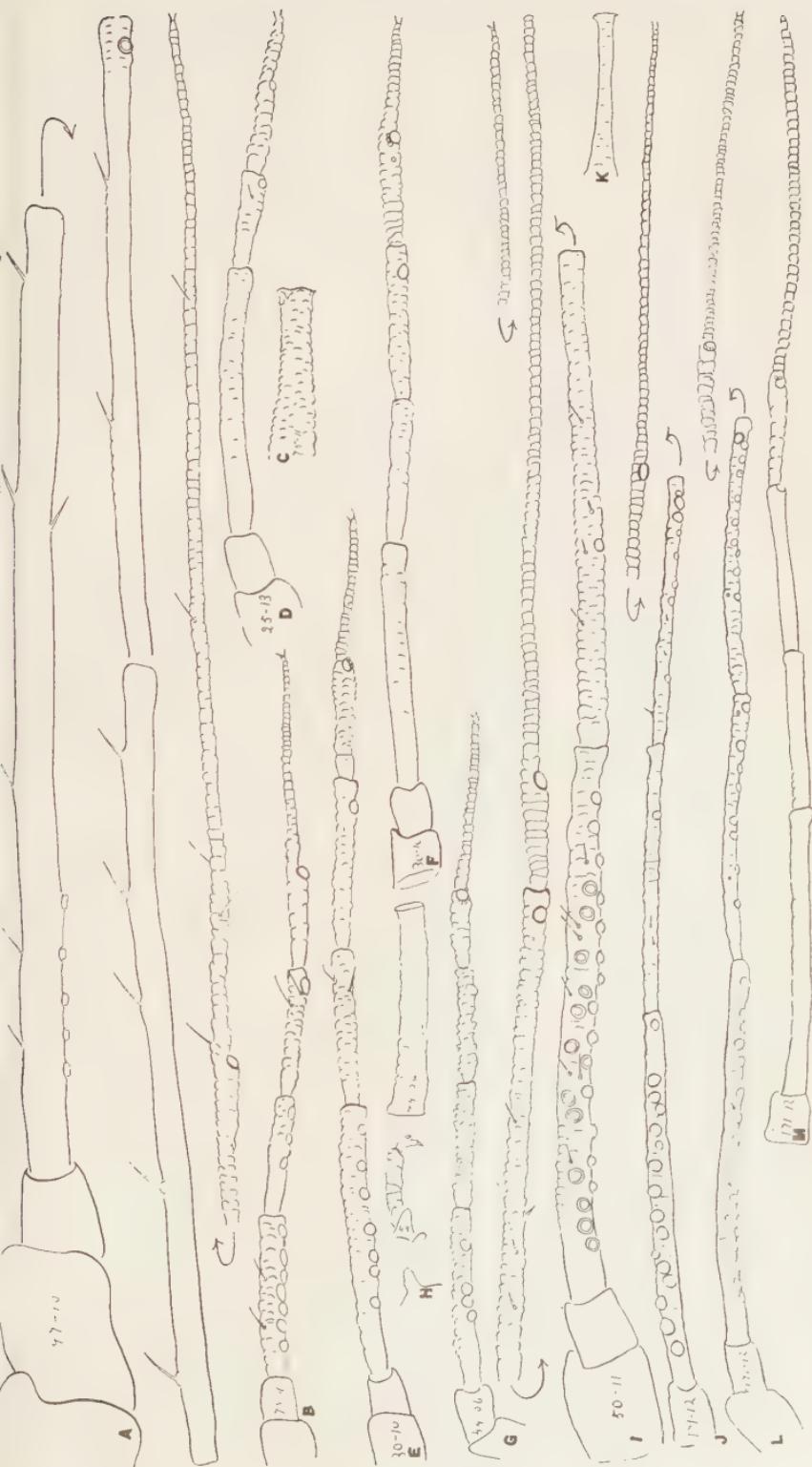


Figure 91. A, *Macrosiphum spiraecola*, apterous viviparous; B-C, *Aphis spiraecola*, alate viviparous; D-F, *Aphis spiraeaphila*, D, stem female; E, alate viviparous; F, apterous viviparous; G-H, *Aphis rubiphila*, antenna, abdominal tubercle, tarsus, and cornicle of alate viviparous; I, *Macrosiphum crataegi*, alate viviparous; J-M, *Myzus porosus*, J-L, alate male; M, apterous oviparous.



Figure 92. A-C, *Macrosiphum dirhodium*, A and C, alate viviparous; B, alate male; D-G, *Myzus rosarium*, D-E, alate viviparous; F-I, apterous viviparous; H-K, *Myzus cerasi*; H, I, and K, alate viviparous; J, apterous viviparous; L-M, *Aphis cordui (prunifoliae)* alate viviparous.

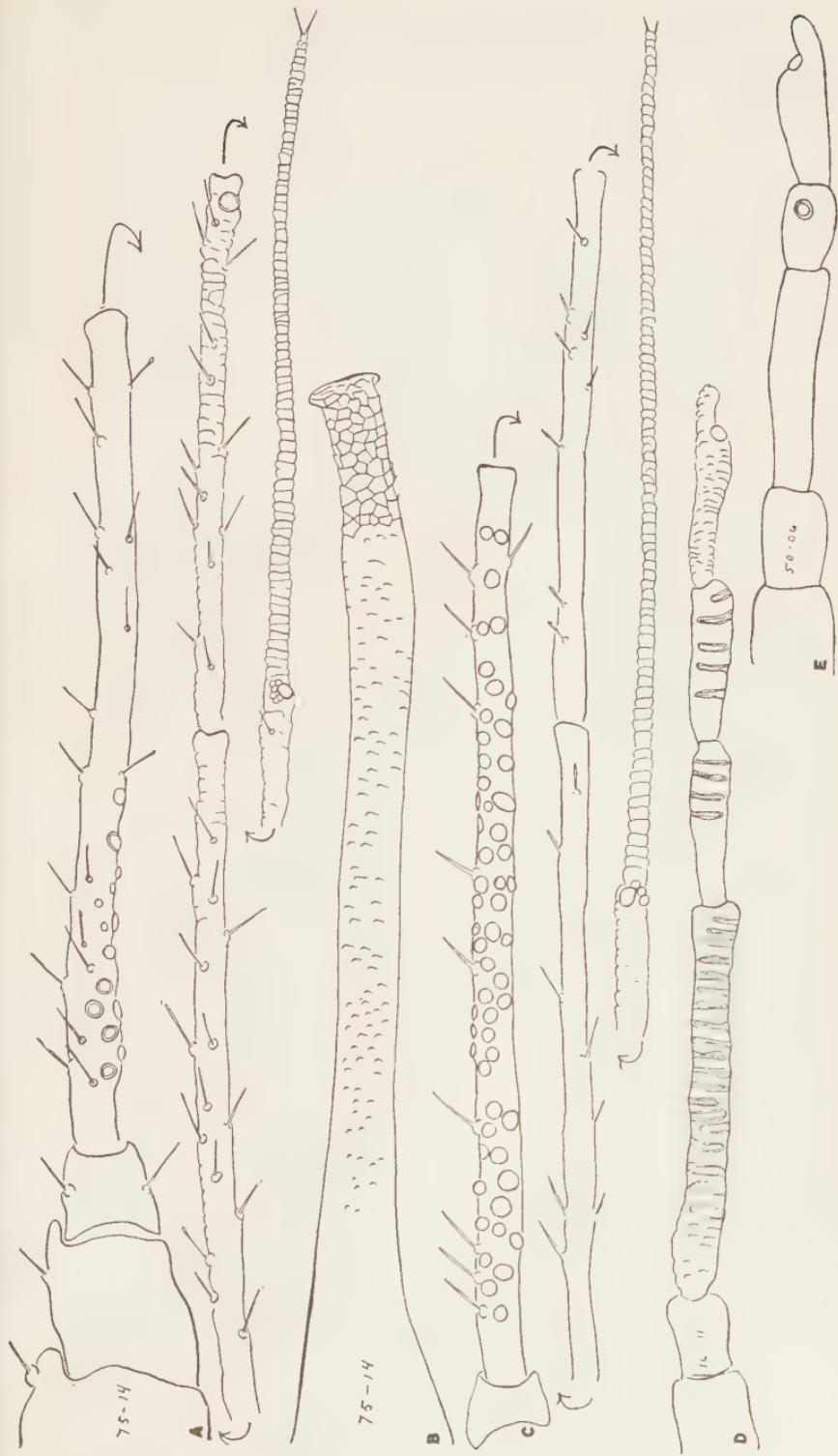


Figure 93. A-C, *Macrosiphum rosae*, apterous viviparous; C, alate viviparous; D-E, *Prociphilus corrugans*, alate viviparous and stem female.

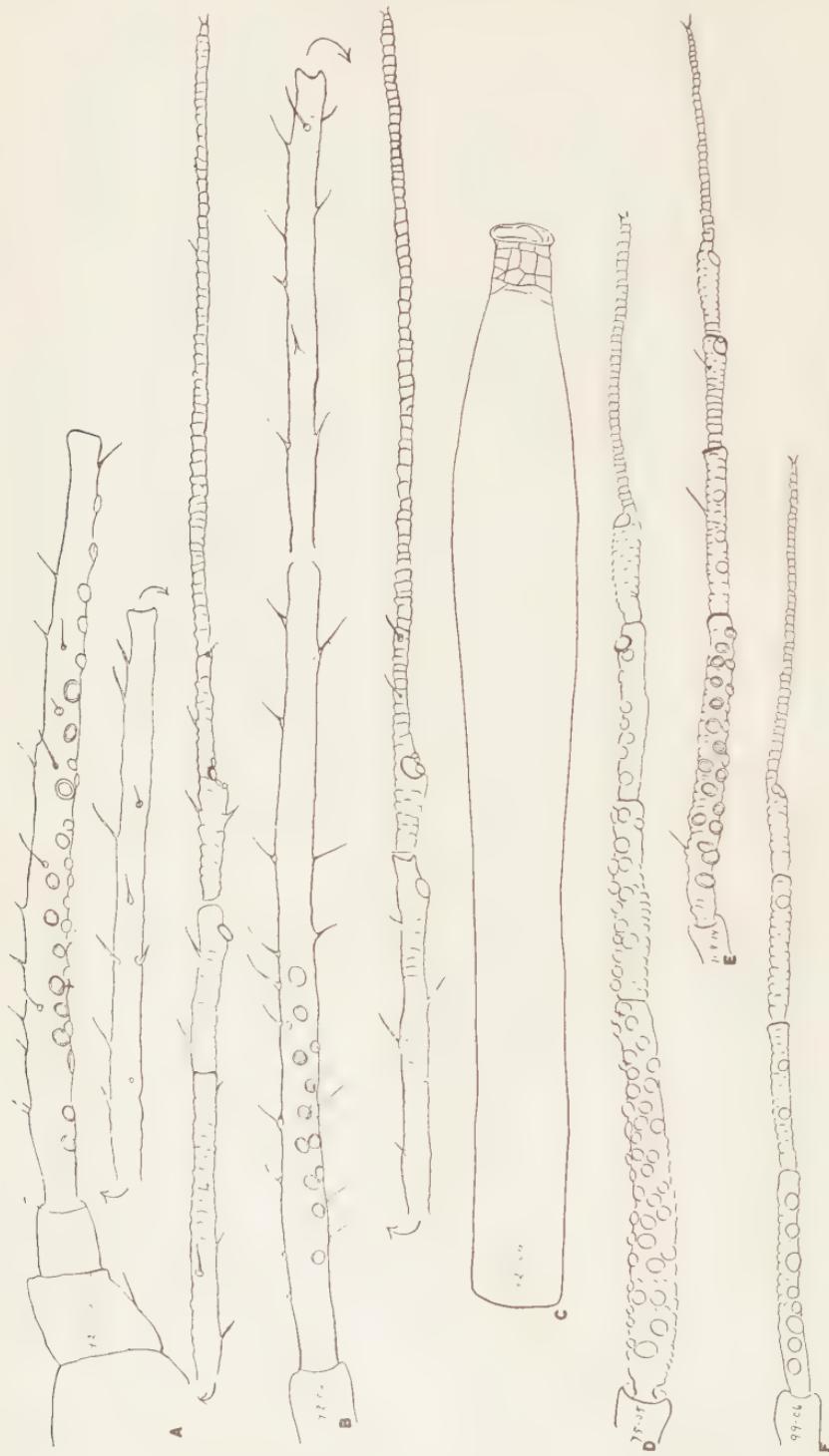


Figure 94. A-C, *Macrosiphum rubicola*, aptate and apterous viviparous; D, *Aphis brevis*, fall migrant on hawthorn; E, *Aphis bakeri*, fall migrant on hawthorn; F, *Aphis furcata*, alate viviparous.

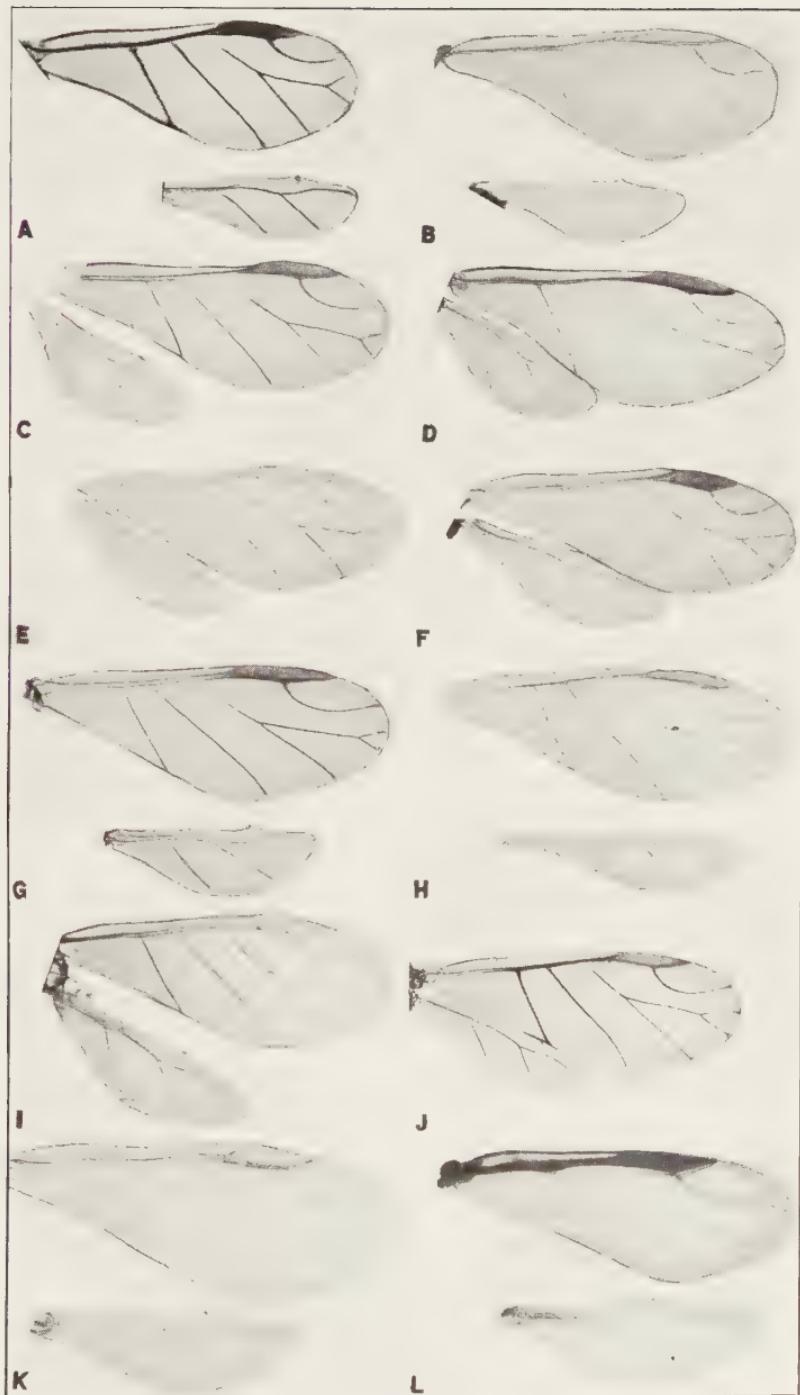


FIGURE 95. A, *Aphis tuberculata*; B, *Myzus cerasi*; C, *Aphis furcata*; D, *Aphis prunorum*; E, *Hyalopterus arundinis*; F, *Aphis cardui* (*prunifoliae*); G, *Aphis cerasifoliae*; H, *Phorodon humuli*; I, *Aphis bakeri*; J, *Macrosiphum crataegi*; K, *Aphis brevis*; L, *Prociphilus corrugatans*.

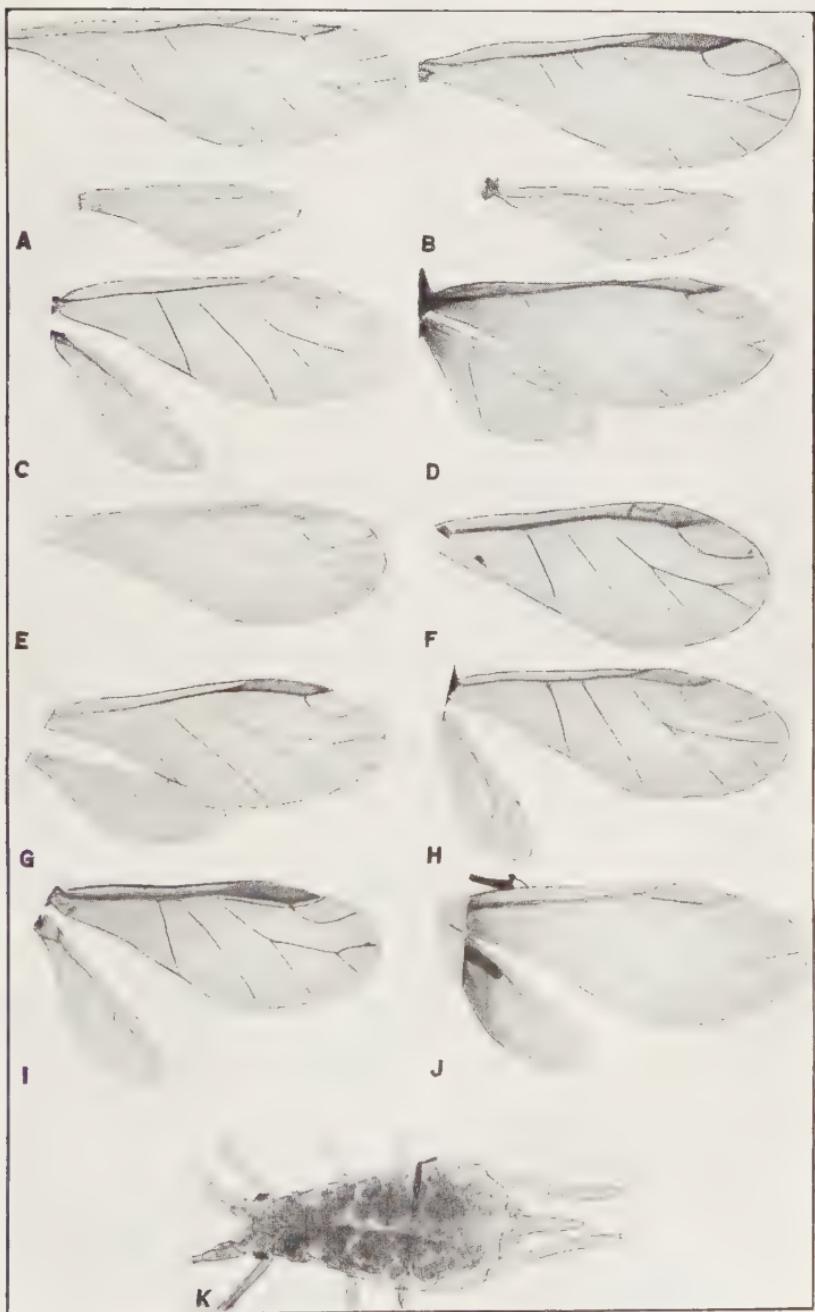


FIGURE 96. A, *Macrosiphum solanifolii?*; B, *Aphis sorbi*; C, *Myzus rosarum*; D, *Aphis avenae*; E, *Macrosiphum dirrhodum?*; F, *Aphis rubiphila*; G, *Myzus persicae*; H, *Myzus porosus?*; I, *Aphis spiraeaphila*; J, *Aphis spiraeocola* n. n.; K, *Macrosiphum spiraeocola* n. sp.

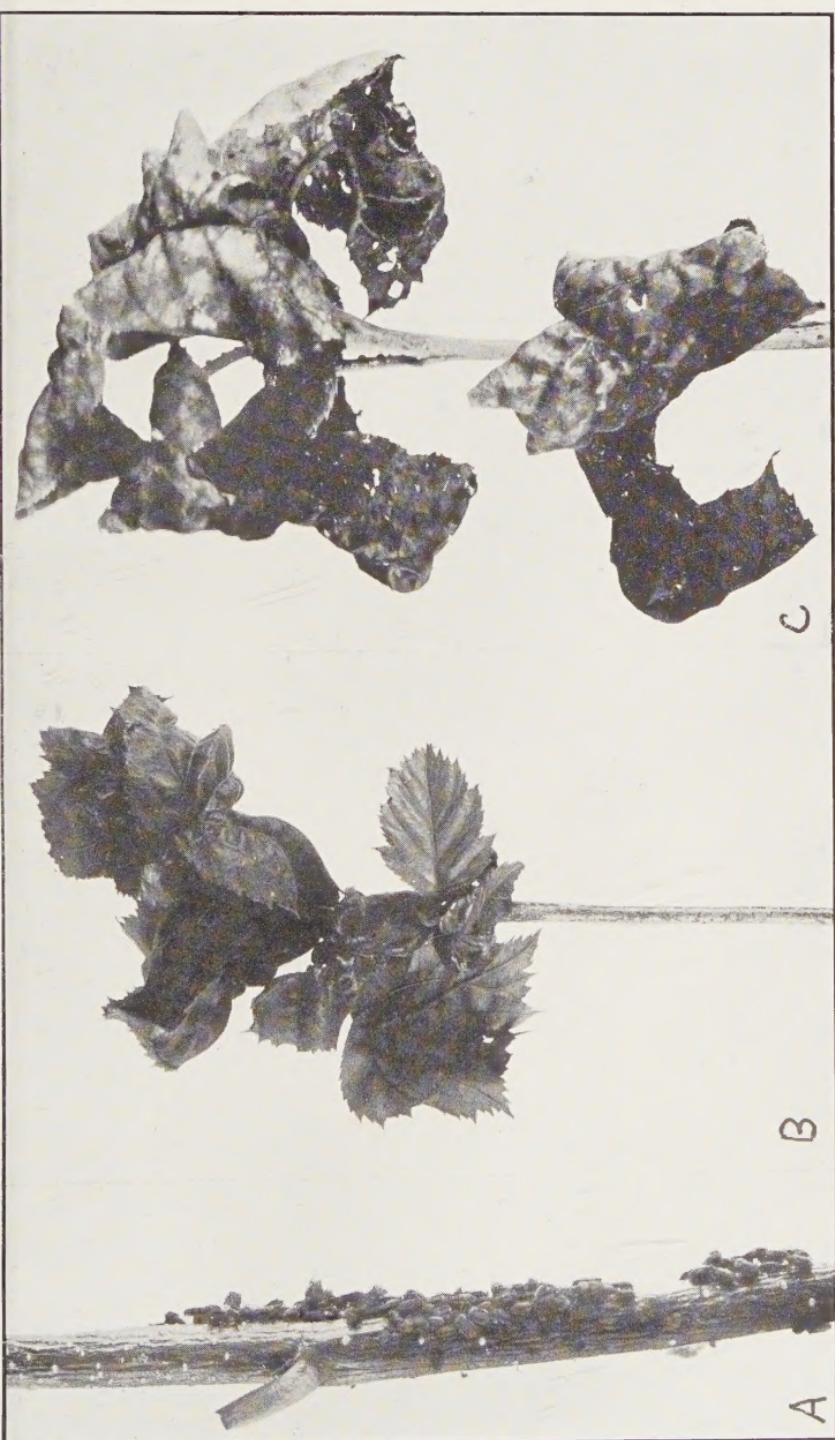


FIGURE 97. A, *Aphis tuberculata*; B, work of *Aphis brevis* on hawthorn; C, work of *Aphis cerasifoliae* on *Prunus virginiana*.

APHID CONTROL.

On account of their small size aphids, or plant lice as they are commonly known, are to a great extent unnoticed; but when conditions are favorable to their increase there are many species of these little creatures that are capable of serious damage to the vegetation which they frequent and staple crops often suffer severely.

These insects occur in winged and wingless forms. Both forms feed by means of a jointed beak which they push into the tissues of the plant in order to suck up the sap which forms their food. Since aphids do not feed on the exposed portion of the leaf, stomach poisons like arsenate of lead are not effective as they are valuable only where caterpillars, or other insects which actually eat up the leaf substance, are concerned. We need, instead, a contact poison which kills the aphid from the outside of its body since we can hardly poison the sap which it sips.

Tobacco sprays will kill these soft-bodied insects and as we know of no injury to the vegetation from their proper use we recommend them for most cases where it is possible to spray at all.

Species inhabiting the trunk or large branches can be destroyed in great numbers by using a brush dipped in any of the spray solutions ordinarily used for aphids.

Tips of branches bearing leaves which have been curled by aphids can be dipped into a pail of tobacco decoction long enough for the solution to penetrate. Such a method as this is of course only applicable for a few treasured plants or small trees.

For many plants underspraying is a necessity, and for this purpose a sprayer should be fitted with an upturned elbow and a nozzle of the Vermorel type so that the under sides of the leaves can be reached.

In recent years tobacco extracts have rapidly taken the place of other sprays for aphids, and well informed apple growers are using them almost to the exclusion of other insecticides. It should be remembered that this is a contact insecticide and kills only the insects actually touched. It is, therefore, necessary to be very thorough in the spraying.

Shade or ornamental trees can be protected frequently from serious aphid attacks by keeping watch from year to year. This is especially desirable while trees are young.

From small or isolated trees the galls of gall forming species can sometimes be collected by hand before the aphids leave them, thus lessening the trouble in that vicinity for another year.

A general account of plant lice, containing a discussion of their habits and of their natural enemies, together with directions for aphid control by remedial measures, is published by this Station under the title of "Aphids" and can be secured free of charge by any resident of Maine who desires it.